MATHEMATICS CROSSWALK
2008 DRAFT MATHEMATICS STANDARD TO 2003 MATHEMATICS STANDARD
GRADE 6

MATHEMATICS STANDARD ARTICULATED BY GRADE LEVEL				
Strand 1: Number and Operations				
CONCEPT	**2008 PO**	**ITEM DESCRIPTION**	**2003 PO**	**ITEM DESCRIPTION**
1. Number Sense	1	Translate between rational numbers including fractions, decimals, percents, or ratios; apply representations of rational numbers including fractions, decimals, percents, or ratios.	1	Express fractions as ratios, comparing two whole numbers (e.g., ¾ is equivalent to 3:4 and 3 to 4).
			4	Determine the equivalency between and among fractions, decimals, and percents in contextual situations.
	2	Use prime factorization to: • determine the greatest common factor and least common multiples of two whole numbers and • express a whole number as a product of its prime factors (including exponents when appropriate).	5	Identify the greatest common factor for two whole numbers.
			6	Determine the least common multiple for two whole numbers.
			7	Express a whole number as a product of its prime factors, using exponents when appropriate.
	3	Demonstrate an understanding of fractions: • as a rate or as division of whole numbers, • as parts of wholes or parts of a set, or • as locations on a number line.*		
	4	Compare and order positive fractions, decimals, percents, and negative and positive integers.	2	Compare two proper fractions, improper fractions, or mixed numbers.
			3	Order three or more proper fractions, improper fractions, or mixed numbers.
	5	Express or interpret positive and negative numbers from real-life contexts.*		
	6	Express the inverse relationships between exponents and roots for perfect squares and cubes.*		

* This performance objective is new to the 2008 Draft Mathematics Standard Articulated by Grade Level.

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Strand 1: Number and Operations				
CONCEPT	**2008 PO**	**ITEM DESCRIPTION**	**2003 PO**	**ITEM DESCRIPTION**
2. Numerical Operations	1	Add, subtract, multiply, and divide fractions, decimals, and whole numbers accurately, efficiently, and flexibly in contextual and non-contextual situations.	1	Select the grade-level appropriate operation to solve word problems.
			2	Solve word problems using grade-level appropriate operations and numbers.
			6	Simplify fractions to lowest terms.
			7	Add or subtract proper fractions and mixed numbers with unlike denominators with regrouping.
			8	Demonstrate the process of multiplication of proper fractions using models.
			9	Multiply proper fractions.
			10	Multiply mixed numbers.
			12	Divide proper fractions.
			13	Divide mixed numbers.
			14	Solve problems involving fractions or decimals (including money) in contextual situations.
	2	Divide multi-digit whole numbers and decimals by decimal divisors accurately, efficiently, and flexibly with and without remainders in contextual and non-contextual situations.*		
	3	Provide a mathematical argument to explain operations with two or more fractions.	3	Apply grade-level appropriate properties to assist in computation.
			4	Apply the symbols for "…" or "‾‾" to represent repeating decimals and ":" to represent ratios, superscripts as exponents.
			5	Use grade-level appropriate mathematical terminology.

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Strand 1: Number and Operations				
CONCEPT	**2008 PO**	**ITEM DESCRIPTION**	**2003 PO**	**ITEM DESCRIPTION**
2. Numerical Operations	4	Apply the commutative, associative, distributive, and identity properties to evaluate numerical expressions involving natural numbers and whole numbers.	15	Simplify numerical expressions using the order of operations with grade-appropriate operations on number sets.
	5	Simplify numerical expressions (involving fractions, decimals, and exponents) using the order of operations with or without grouping symbols.	15	Simplify numerical expressions using the order of operations with grade-appropriate operations on number sets.
	M07-S1C2-03	**Moved to Grade 7**	11	Demonstrate that division is the inverse of multiplication of proper fractions.
3. Estimation	1	Use benchmarks as meaningful points of comparison for integers and negative fractions in and out of context.*		
	2	Make estimates appropriate to a given situation by • identifying when estimation is appropriate, • determining the level of accuracy needed, • selecting the appropriate method of estimation, and • verifying solutions or determining the reasonableness of situations using various estimation strategies.	1	Solve grade-level appropriate problems using estimation.
			2	Use estimation to verify the reasonableness of a calculation (e.g., Is 5/9 x 3/7 more than 1?).
			3	Round to estimate quantities in contextual situations (e.g., round up or round down).
			4	Estimate and measure for the area and perimeter of polygons using a grid.
			5	Verify the reasonableness of estimates made from calculator results within a contextual situation.

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Strand 2: Data Analysis, Probability, and Discrete Mathematics				
CONCEPT	**2008 PO**	**ITEM DESCRIPTION**	**2003 PO**	**ITEM DESCRIPTION**
1. Data Analysis (Statistics)	1	Solve contextual problems by constructing and utilizing a histogram or stem-and-leaf plot with appropriate labels, title, and intervals from collected data.	2	Construct a histogram, line graph, scatter plot, or stem-and-leaf plot with appropriate labels and title from organized data.
			8	Solve contextual problems using bar graphs, tally charts, and frequency tables.
	2	Read, interpret, and answer questions from displays of data.	1	Formulate questions to collect data in contextual situations.
			3	Interpret simple displays of data including double bar graphs, tally charts, frequency tables, circle graphs, and line graphs.
			4	Answer questions based on simple displays of data including double bar graphs, tally charts, frequency tables, circle graphs, and line graphs.
	3	Solve contextual problems by applying the following measures for a data set (extreme values, mean, median, mode, range, and frequency); state how the measures describe the data.	5	Find the mean, median (odd number of data points), mode, range, and extreme values of a given numerical data set.
	4	Compare data by identifying trends (increasing, decreasing, remaining constant).	6	Identify a trend (variable increasing, decreasing, remaining constant) from displayed data.
			7	Compare trends in data related to the same investigation.

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Strand 2: Data Analysis, Probability, and Discrete Mathematics				
CONCEPT	**2008 PO**	**ITEM DESCRIPTION**	**2003 PO**	**ITEM DESCRIPTION**
2. Probability	1	Use data collected from multiple trials of a single event to form a conjecture about the theoretical probability.	3	Predict the outcome of a grade-level appropriate probability experiment.
	2	Determine all possible outcomes (sample space) of a given situation using a systematic approach (e.g., frequency tables, tree diagrams, charts/tables, ordered pairs, matrices).	1	Name the possible outcomes for a probability experiment.
			4	Record the data from performing a grade-level appropriate probability experiment.
	3	Use theoretical probability to predict experimental outcomes: • compare the outcome of the experiment to the prediction and • replicate the experiment and compare results.	3	Predict the outcome of a grade-level appropriate probability experiment.
			5	Compare the outcome of an experiment to predictions made prior to performing the experiment.
			6	Make predictions from the results of student-generated experiments using objects (e.g., coins, spinners, number cubes, cards).
	M05-S2C2-01	**Moved to Grade 5**	2	Express probabilities of a single event as a decimal.
3. Discrete Mathematics – Systematic Listing and Counting	1	Explore counting problems with Venn diagrams using three attributes.*		
	2	Build and explore tree diagrams where items repeat (e.g., all possible arrangements of the letters in the word TREE).*		
	M05-S2C3-01	**Moved to Grade 5**	1	Determine all possible outcomes involving a combination of three sets of three items, using a systematic approach (e.g., 3 different shirts, 3 different pairs of pants, and 3 different belts).
	M05-S2C3-01	**Moved to Grade 5**	2	Determine all possible arrangements given a set with four or fewer objects using a systematic list, table or tree diagram when order is not important.

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Strand 2: Data Analysis, Probability, and Discrete Mathematics				
CONCEPT	**2008 PO**	**ITEM DESCRIPTION**	**2003 PO**	**ITEM DESCRIPTION**
4. Discrete Mathematics – Vertex-Edge Graphs	1	Analyze a variety of vertex-edge graphs to determine and explain why a particular graph cannot be colored using one fewer color.*		
	2	Investigate properties of vertex-edge graphs: • Hamilton path and • Hamilton circuit.*		
	M03-S2C4-02	**Moved to Grade 3**	1	Find the shortest route on a map from one site to another (vertex-edge graph).

Strand 3: Patterns, Algebra, and Functions				
CONCEPT	**2008 PO**	**ITEM DESCRIPTION**	**2003 PO**	**ITEM DESCRIPTION**
1. Patterns	1	Describe, analyze, and create sequential patterns using order of operations.	1	Communicate a grade-level appropriate recursive pattern, using symbols or numbers.
			2	Extend a grade-level appropriate iterative pattern.
			3	Solve grade-level appropriate iterative pattern problems.
2. Functions and Relationships	1	Generalize a pattern appearing in a chart, table, or graph using words and expressions.	1	Describe the rule used in a simple grade-level appropriate function (e.g., T-chart, input/output model).

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Strand 3: Patterns, Algebra, and Functions				
CONCEPT	**2008 PO**	**ITEM DESCRIPTION**	**2003 PO**	**ITEM DESCRIPTION**
3. Algebraic Representations	1	Use algebraic symbols to represent variables in contextual situations.	2	Use variables in contextual situations.
	2	Evaluate expressions involving the four basic operations by substituting given fractions and decimals for the variable (e.g., *n*+3, when *n*= ½).	1	Evaluate expressions involving the four basic operations by substituting given fractions for the variable (e.g., *n*+3, when *n*= ½).
	3	Solve one-step equations with one variable represented by a letter or symbol, using inverse operations with whole numbers.	5	Solve one-step equations with one variable represented by a letter or symbol, using inverse operations with whole numbers.
	4	Translate a written phrase in and out of context to an algebraic expression or equation.	3	Translate a written phrase to an algebraic expression (e.g., The quotient of *m* and 5 is $\frac{m}{5}$ *or* $m \div 5$.).
			4	Translate a phrase written in context into an algebraic expression (e.g., Write an expression to describe the situation: John has *x* pieces of candy and buys three more. *x* + 3).
4. Analysis of Change	1	Determine a pattern to predict missing values on a line graph or scatter plot.*		
	M07-S2C1-01	**Moved to Grade 7**	1	Identify values on a given line graph or scatter plot (e.g., Given a line showing wages earned per hour, what is the wage at five hours?).

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Strand 4: Geometry and Measurement				
CONCEPT	**2008 PO**	**ITEM DESCRIPTION**	**2003 PO**	**ITEM DESCRIPTION**
1. Geometric Properties	1	Demonstrate the relationship among the diameter, radius, circumference, and definition of a circle and π.	8	Identify the diameter, radius, and circumference of a circle or sphere.
	2	Solve problems with supplementary, complementary, and vertical angles.	7	Identify supplementary or complementary angles.
	M05-S4C1-01	**Moved to Grade 5**	1	Classify polygons by their attributes (e.g., number of sides, length of sides, angles, parallelism, perpendicularity).
	M05-S4C1-02	**Moved to Grade 5**	2	Draw a geometric figure showing specified properties, such as parallelism and perpendicularity.
	M07-S4C1-02	**Moved to Grade 7**	3	Classify prisms, pyramids, cones, and cylinders by base shape and lateral surface shape.
	M07-S4C1-02	**Moved to Grade 7**	4	Classify 3-dimensional figures by their attributes.
	M04-S4C1-03	**Moved to Grade 4**	5	Compare attributes of 2-dimensional figures with 3-dimensional figures.
	M05-S4C1-02	**Moved to Grade 5**	6	Draw triangles with appropriate labels.
	M03-S4C2-01	**Moved to Grade 3**	9	Draw a 2-dimensional shape with a given number of lines of symmetry.

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Strand 4: Geometry and Measurement				
CONCEPT	**2008 PO**	**ITEM DESCRIPTION**	**2003 PO**	**ITEM DESCRIPTION**
2. Transformation of Shapes	1	Draw a reflection of a polygon in the coordinate plane using a horizontal or vertical line of reflection (symmetry); explain why the resulting figure is symmetrical.	1	Identify reflections and translations using pictures.
	2	Recognize and identify simple single translations and reflections on a coordinate plane using all four quadrants.	1	Identify reflections and translations using pictures.
	M08-S4C2-03	**Moved to Grade 8**	2	Perform elementary transformations to create a tessellation.
3. Coordinate Geometry	1	Graph ordered pairs in any quadrant of the coordinate plane.	1	Graph a polygon in the first quadrant using ordered pairs.
	2	State the missing coordinate of a given figure on the coordinate plane using geometric properties to justify the solution.	2	State the missing coordinate of a given figure in the first quadrant of a coordinate grid using geometric properties (e.g., Find the coordinates of the missing vertex of a rectangle when two adjacent sides are drawn.).
4. Measurement	1	Estimate the measure of objects using a scale drawing or map.	11	Determine the actual measure of objects using a scale drawing or map.
	2	Determine the appropriate unit of measure for a contextual situation and the appropriate tool to measure to the needed precision (including but not limited to length, capacity, angles, time, and mass).	1	Determine the appropriate measure of accuracy within a system for a given contextual situation (e.g., Would you measure the length of your bedroom wall using inches or feet?).
			2	Determine the appropriate tool needed to measure to the needed accuracy.
			3	Determine a linear measurement to the appropriate degree of accuracy.
	3	Convert within a single measurement system: • U.S. customary and • metric.	5	Convert within a single measurement system (U.S. customary or metric) (e.g., How many ounces are equivalent to 2 pounds?).

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Strand 4: Geometry and Measurement				
CONCEPT	**2008 PO**	**ITEM DESCRIPTION**	**2003 PO**	**ITEM DESCRIPTION**
4. Measurement	4	Solve problems by determining the relationship between area and perimeter for regular and irregular polygons.	6	Solve problems involving the perimeter of polygons.
			7	Determine the area of triangles.
			8	Distinguish between perimeter and area in contextual situation.
	5	Solve problems involving the area of simple polygons using formulas for rectangles and triangles.	9	Solve problems for the areas of parallelograms (includes rectangles).
	6	Describe the relationship between the volume of a figure and the area of its base.*		
	M05-S4C4-02	**Moved to Grade 5**	4	Measure angles using a protractor.
	M05-S4C4-04	**Moved to Grade 7**	10	Identify parallelograms having the same perimeter or area.

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Strand 5: Structure and Logic				
CONCEPT	**2008 PO**	**ITEM DESCRIPTION**	**2003 PO**	**ITEM DESCRIPTION**
1. Algorithms and Algorithmic Thinking	1	Analyze algorithms for computing with fractions.	2	Analyze algorithms for computing with decimals.
	2	Create and justify an algorithm to determine the area of a given compound figure using parallelograms and triangles.*		
	M05-S5C1-01	**Moved to Grade 5**	1	Discriminate necessary information from unnecessary information in a given grade-level appropriate word problem.
2. Logic, Reasoning, Arguments, and Mathematical Proof	1	Develop the problem-solving strategy of working backwards.*		
	2	Solve a non-routine problem by selecting and using a strategy.*		
	3	Solve simple logic problems, including conditional statements, and justify solution methods and reasoning.	1	Solve a simple logic problem from given information (e.g., Which of three different people live in which of three different colored houses?).

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